

## Complete Summary

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### GUIDELINE TITLE

ACR Appropriateness Criteria™ for evaluation of acute right lower quadrant pain.

### BIBLIOGRAPHIC SOURCE(S)

Ralls PW, Balfe DM, Bree RL, DiSantis DJ, Glick SN, Levine MS, Megibow AJ, Saini S, Shuman WP, Greene FL, Laine LA, Lillemoe K. Evaluation of acute right lower quadrant pain. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun; 215(Suppl): 159-66. [35 references]

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## SCOPE

### DISEASE/CONDITION(S)

Acute right lower quadrant pain

### GUIDELINE CATEGORY

Diagnosis

### CLINICAL SPECIALTY

Emergency Medicine  
 Family Practice  
 Internal Medicine  
 Radiology  
 Surgery

### INTENDED USERS

Health Plans  
Hospitals  
Managed Care Organizations  
Physicians  
Utilization Management

#### GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for patients with acute right lower quadrant pain

#### TARGET POPULATION

Patients with acute right lower quadrant pain

#### INTERVENTIONS AND PRACTICES CONSIDERED

1. Plain x-ray
  - Chest
  - Anteroposterior and upright abdomen
2. Ultrasound
  - Right lower quadrant graded compression
  - Pelvic/endovaginal
3. Computed tomography
  - Contrast enhanced computed tomography
  - Non-contrast (no oral or intravenous contrast)
4. Nuclear medicine
  - White blood cell scanning
  - Gallium
5. Magnetic resonance imaging
  - Abdomen with or without enhancement
6. Barium fluoroscopy procedure
  - Air-contrast barium enema
  - Conventional small-bowel series
  - Enteroclysis of the small bowel
  - Single-contrast barium enema

#### MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

### METHODOLOGY

#### METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

#### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of recent peer-reviewed medical journals, primarily using the National Library of Medicine's MEDLINE database. The developer identified and collected the major applicable articles.

#### NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

#### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Delphi Method)  
Weighting According to a Rating Scheme (Scheme Not Given)

#### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

#### METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

#### DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

#### METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

#### DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the Appropriateness Criteria. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty (80) percent agreement is considered a consensus. If consensus cannot be reached by this method, the panel is convened and group consensus techniques are utilized. The strengths and

weaknesses of each test or procedure are discussed and consensus reached whenever possible.

#### RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

#### COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

#### METHOD OF GUIDELINE VALIDATION

Internal Peer Review

#### DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria and the Chair of the ACR Board of Chancellors.

### RECOMMENDATIONS

#### MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria™

Clinical Condition: Acute Right Lower Quadrant Pain

Variant 1: Fever, leukocytosis, and classic presentation clinically for appendicitis.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Plain X-ray		
Chest	4	
Anteroposterior and upright abdomen	4	
Ultrasound		
Right lower quadrant graded compression	4	Imaging is rarely needed in this setting. If some contraindication exists for surgery or other potential complications or if there is

		anything atypical in the presentation, and imaging is needed, ultrasound or computed tomography could be used for confirmation. Color Doppler can often be helpful in the ultrasound evaluation.
Pelvic/endovaginal	3	
Computed Tomography		
Contrast enhanced computed tomography	4	
Non-contrast (no oral or intravenous contrast)	2	
Nuclear Medicine		
White blood cell scanning	2	
Gallium	2	
Magnetic Resonance Imaging		
Abdomen with or without enhancement	2	
Barium Fluoroscopy Procedure		
Air-contrast barium enema	2	
Conventional small-bowel series	2	
Enteroclysis of the small bowel	2	
Single-contrast barium enema	No Consensus	
<p style="text-align: center;"><u>Appropriateness Criteria Scale</u></p> <p style="text-align: center;">1 2 3 4 5 6 7 8 9</p> <p style="text-align: center;">1=Least appropriate 9=Most appropriate</p>		

Variant 2: Fever, leukocytosis; possible appendicitis, atypical presentation, thin patient.

Radiologic Exam Procedure	Appropriateness Rating	Comments
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Ultrasound		
Right lower quadrant graded compression	8	Color Doppler can often be helpful in the ultrasound evaluation.
Pelvic/endovaginal	6	
Computed Tomography		
Contrast enhanced computed tomography	6	
Non-contrast (no oral or intravenous contrast)	2	
Plain X-ray		
Anteroposterior and upright abdomen	6	
Chest	4	
Barium Fluoroscopy Procedure		
Air-contrast barium enema	4	If the higher indicated tests are negative, further evaluation of the intestinal tract would be indicated to exclude other diseases that can have a similar presentation.
Conventional small-bowel series	4	If the higher indicated tests are negative, further evaluation of the intestinal tract would be indicated to exclude other diseases that can have a similar presentation.
Single-contrast barium enema	No Consensus	If the higher indicated tests are negative, further evaluation of the intestinal tract would be indicated to exclude other diseases that can have a similar presentation.
Enteroclysis of the small bowel	No Consensus	If the higher indicated tests are negative, further evaluation of the intestinal tract would be indicated to exclude other

		diseases that can have a similar presentation.
Nuclear Medicine		
White blood cell scanning	2	
Gallium	2	
Magnetic Resonance Imaging		
Abdomen with or without enhancement	2	
<p align="center"><u>Appropriateness Criteria Scale</u></p> <p align="center">1 2 3 4 5 6 7 8 9</p> <p align="center">1=Least appropriate 9=Most appropriate</p>		

Variant 3: Fever, leukocytosis, possible appendicitis, obese patient.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Computed Tomography		
Contrast enhanced computed tomography	8	
Non-contrast (no oral or intravenous contrast)	3	
Ultrasound		
Right lower quadrant graded compression	6	Color Doppler can often be helpful in the ultrasound evaluation.
Pelvic/endovaginal	6	
Plain X-ray		
Chest	4	
Anteroposterior and upright abdomen	4	
Barium Fluoroscopy Procedure		
Air-contrast barium enema	4	If the higher indicated tests are not contributory to the cause of the pain,

		direct investigation of the large and small bowel are indicated.
Conventional small-bowel series	4	If the higher indicated tests are not contributory to the cause of the pain, direct investigation of the large and small bowel are indicated.
Single-contrast barium enema	No Consensus	If the higher indicated tests are not contributory to the cause of the pain, direct investigation of the large and small bowel are indicated.
Enteroclysis of the small bowel	No Consensus	If the higher indicated tests are not contributory to the cause of the pain, direct investigation of the large and small bowel are indicated.
Nuclear Medicine		
White blood cell scanning	3	
Gallium	2	
Magnetic Resonance Imaging		
Abdomen with or without enhancement	2	
<p align="center"><u>Appropriateness Criteria Scale</u></p> <p align="center">1 2 3 4 5 6 7 8 9</p> <p align="center">1=Least appropriate 9=Most appropriate</p>		

Variant 4: Fever, leukocytosis, pregnant woman.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Ultrasound		
Right lower quadrant graded compression	8	Color Doppler can often be helpful in the ultrasound evaluation.



Pelvic/endovaginal	8	
Computed Tomography		
Contrast enhanced computed tomography	3	If needed in late term only.
Non-contrast (no oral or intravenous contrast)	2	
Plain X-ray		
Chest	2	
Anteroposterior and upright abdomen	2	
Nuclear Medicine		
White blood cell scanning	2	
Gallium	2	
Magnetic Resonance Imaging		
Abdomen with or without enhancement	2	
Barium Fluoroscopy Procedure		
Single-contrast barium enema	2	
Air-contrast barium enema	2	
Conventional small-bowel series	2	
Enteroclysis of the small bowel	2	
<p align="center"><u>Appropriateness Criteria Scale</u></p> <p align="center">1 2 3 4 5 6 7 8 9</p> <p align="center">1=Least appropriate 9=Most appropriate</p>		

Variant 5: Fever, leukocytosis, woman younger than age 45.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Ultrasound		
Right lower quadrant graded compression	8	Color Doppler can be helpful in the ultrasound evaluation.

Pelvic/endovaginal	8	
Computed Tomography:		
Contrast enhanced computed tomography	6	
Non-contrast (no oral or intravenous contrast)	2	
Plain X-ray		
Chest	4	
Anteroposterior and upright abdomen	4	
Barium Fluoroscopy Procedure		
Single-contrast barium enema	4	If the higher indicated tests are not contributory to the cause of the pain, direct investigation of the large and small bowel are indicated.
Air-contrast barium enema	4	If the higher indicated tests are not contributory to the cause of the pain, direct investigation of the large and small bowel are indicated.
Conventional small-bowel series	4	If the higher indicated tests are not contributory to the cause of the pain, direct investigation of the large and small bowel are indicated.
Enteroclysis of the small bowel	2	If the higher indicated tests are not contributory to the cause of the pain, direct investigation of the large and small bowel are indicated.
Nuclear Medicine		
White blood cell scanning	2	
Gallium	2	
Magnetic Resonance Imaging		

Abdomen with or without enhancement	2	
<p align="center"><u>Appropriateness Criteria Scale</u></p> <p align="center">1 2 3 4 5 6 7 8 9</p> <p align="center">1=Least appropriate 9=Most appropriate</p>		

Excerpted by the National Guideline Clearinghouse (NGC)

### Summary

Because appendicitis is the most common cause of right lower quadrant pain, the focus of this narrative is on appendicitis and the accuracy of imaging procedures in diagnosing appendicitis, although consideration of other diseases is, of course, included.

Clearly, the use of computed tomography and sonography is heavily influenced by institutional preference and expertise. Until more information is available, the following approaches might be appropriate:

1. Sonography Preferred: Graded compression sonography should be used as the screening test in all patients. Computed tomography might be used as a primary modality in selected patients who are obese, who have a rigid, noncompressible abdomen, or in whom there is a strong suspicion of advanced complicated appendicitis with periappendiceal abscess.
2. Computed Tomography Preferred: Almost all authorities agree that graded compression sonography should be used first in children, young women, and pregnant patients. Computed tomography is used first in all other patients and as a secondary study in selected patients who have pain that suggests a condition requiring surgery and an equivocal or graded compression sonogram.

While current clinical practice generally favors use of ultrasound or computed tomography for suspected appendicitis, a long tradition of using barium enema has existed. The development of ultrasound and computed tomography has markedly decreased this utilization. Nonetheless, barium small-bowel follow-through or barium enema may also be useful for other causes of right lower quadrant pain, including suspected small bowel obstruction, infectious ileitis, and inflammatory bowel disease. Ultrasound and computed tomography have also been reported helpful in evaluating these etiologies and can demonstrate similar findings of bowel wall thickening.

### CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with acute right lower quadrant pain.

Subgroups Most Likely to Benefit:

Patients with acute appendicitis

### POTENTIAL HARMS

Barium enema may be quite uncomfortable in patients with acute appendicitis.

## QUALIFYING STATEMENTS

### QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better

### IOM DOMAIN

Effectiveness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Ralls PW, Balfe DM, Bree RL, DiSantis DJ, Glick SN, Levine MS, Megibow AJ, Saini S, Shuman WP, Greene FL, Laine LA, Lillemoe K. Evaluation of acute right lower quadrant pain. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun; 215(Suppl): 159-66. [35 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

1996 (revised 1999)

### GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

### SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria.™

### GUIDELINE COMMITTEE

ACR Appropriateness Criteria™ Committee, Expert Panel on Gastrointestinal Imaging.

### COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Names of Panel Members: Philip W. Ralls, MD; Dennis M. Balfe, MD; Robert L. Bree, MD; David J. DiSantis, MD; Seth N. Glick, MD; Marc S. Levine, MD; Alec J.

Megibow, MD, MPH; Sanjay Saini, MD; William P. Shuman, MD; Frederick Leslie Greene, MD; Loren A. Laine, MD; Keith Lillemoe, MD

#### FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

#### GUIDELINE STATUS

This is the current release of the guideline. It is a revision of a previously issued version (Appropriateness criteria for evaluation of acute right lower quadrant pain. Reston [VA]: American College of Radiology (ACR); 1996. 8 p. [ACR Appropriateness Criteria™]).

The ACR Appropriateness Criteria™ are reviewed after five years, if not sooner, depending upon introduction of new and highly significant scientific evidence. The next review date for this topic is 2004.

#### GUIDELINE AVAILABILITY

Electronic copies: Available from the [American College of Radiology \(ACR\) Web site](#).

Print copies: Available from ACR, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

#### AVAILABILITY OF COMPANION DOCUMENTS

None available

#### PATIENT RESOURCES

None available

#### NGC STATUS

This summary was completed by ECRI on March 19, 2001. The information was verified by the guideline developer on March 29, 2001.

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